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SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
08/898,560	07/22/97	NAKANE H	77620/495

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EXAMINER	
STOLE,E	
ART UNIT	PAPER NUMBER
1652	

DATE MAILED:
05/11/98

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents

Office Action Summary	Application No. 08/898,560	Applicant(s) Nakane et al.
	Examiner Einar Stole	Group Art Unit 1652

☐ Responsive to communication(s) filed on _____ .

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1-16* is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-16* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐approved ☐disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☒ received.

☐ received in Application No. (Series Code/Serial Number) _____ .

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____ .

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). *5, 8, 9, 10*

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

1. Claims 1-16 are presented for examination.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

3. The drawings are objected to because of the defects noted on the enclosed Form PTO-948. Correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is the only independent claim and claims 2-16 depend from claim 1. Claim 1 is drawn to a mutant prenyl diphosphate synthase wherein the modified amino acid is selected from three

different groups, (a), (b) and (c). The groups are linked by "and" and "and/or". It is unclear which mutations are intended. For example, it is unclear whether claim 1 is drawn to a mutant prenyl diphosphate synthase wherein at least one amino acid is selected from group (a) **and** group (b) **and** group (c), or one amino acid is selected from group (a) **and** group (b) **or** group (c),or group (a) **and** group (c), or group (a) **or** group (b) **or** group (c). In the interest of compact prosecution, the claims have been treated on the merits and this portion of claim 1 has been interpreted to read on a modified amino acid selected from group (a) **or** group (b) **or** group (c).

5. Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "the amino acid residue located at the fifth position in the N-terminal direction from D of the **N-terminal**". This phrase renders claim 1 indefinite, because it is unclear which N-terminal (see bold) is referred to. Also, "D" is undefined in the claim. In the interest of compact prosecution, the claims have been treated on the merits, and this portion of claim 1 has been interpreted to read on the amino acid residue located at the fifth position N-terminal from the first aspartic acid residue of the aspartic acid-rich domain DDXX(XX)D present in region II of a prenyl diphosphate synthase.

6. Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "the amino acid residue located at the first position in the N-terminal direction from D of the C-terminal of said aspartic acid-rich domain". In the interest of compact prosecution, the claims have been treated on the merits. This phrase renders claim 1 indefinite, because it is unclear which amino acid is the amino acid located "at the first position". Also, "D" is undefined in the claim. In the interest of compact prosecution, the claims have been treated on the merits, and this portion of claim 1 has been interpreted to read on the amino acid residue located at position 6 (see bold) of the aspartic acid-rich domain DDXX(XX)D present in region II of a prenyl diphosphate synthase.

7. Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "the amino acid residue located at the first position in the N-terminal direction from **D of the C-terminal** and D of the C-terminal of said aspartic acid-rich domain". This phrase renders claim 1 indefinite, because it is unclear which C-terminal is referred to in the first occurring use of this phrase. Although the second occurring "D of the C-terminal" relates to the final D in the DDXX(XX)**D** of the aspartic acid-rich domain present in region II, it is unclear which D is referred to in the first occurrence of this phrase. Also, "D" is undefined in the claim. In the interest of compact prosecution, the claims have been treated on the merits, and this portion of claim 1 has been interpreted to read "the amino acid residue located at the first position in the N-terminal direction from **D of the N-terminal** and D of the C-terminal of said aspartic acid-rich domain". Thus, this

portion of claim 1 reads on the amino acid residue located at position 2 (see bold) of the aspartic acid-rich domain DDXX(XX)D present in region II of a prenyl diphosphate synthase.

8. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 6 recites "retains the properties owned by the prenyl diphosphate synthase prior to mutation." This phrase renders the instant claim indefinite, because the properties referred to are undefined and the meaning of "properties" is unclear. It is unclear whether the term refers to enzymatic properties, kinetic properties, thermodynamic properties, antigenic properties, immunogenic properties, catalytic properties, biological properties, or all possible properties. In the interest of compact prosecution, the claims have been treated on their merits, and claim 6 has been interpreted to mean kinetic properties.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-16 are rejected under 35 U.S.C. 102(a) as being anticipated by Ohnuma et al. (N). Claims 1-16 are drawn to mutant prenyl diphosphate synthases (claims 1-10), nucleic acids, vectors, hosts cells and expression systems of the mutant enzymes (claims 11-15) and a method of using the mutant enzyme to produce a prenyl diphosphate. The mutant enzymes read on any prenyl diphosphate synthase in which an amino acid at the fifth amino acid upstream from the first aspartic acid residue of the first aspartic acid-rich domain has been substituted by another amino acid residue.

Ohnuma et al. (N) teach a mutant prenyl diphosphate synthase which comprises at least one mutation at amino acid position 77, 85, 99, 101, 118, 199 or 312 of *Sulfolobus acidocaldarius* geranylgeranyl diphosphate synthase. (see abstract). Amino acid 77 (Phe) corresponds to the fifth amino acid upstream from the first aspartic acid residue of the first aspartic acid-rich domain, DDXX(XX)D. Thus, the mutant enzymes taught by Ohnuma et al. (N) anticipate the instant claims, claims 1-16.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

10. Claims 1-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohnuma et al. (AZ). Claims 1-16 are drawn to mutant prenyl diphosphate synthases (claims 1-10), nucleic acids, vectors, hosts cells and expression systems of the mutant enzymes (claims 11-15) and a method of using the mutant enzyme to produce a prenyl diphosphate. The mutant enzymes read on any prenyl

diphosphate synthase in which an amino acid at the fifth amino acid upstream from the first aspartic acid residue of the first aspartic acid-rich domain has been substituted by another amino acid residue.

Ohnuma et al. (AZ) teach a mutant geranylgeranyl diphosphate synthase from Bacillus stearothermophilus which contains a modification of tyrosine-81. Tyrosine-81 is located five positions from aspartate-86, the first aspartic acid of the first aspartic acid-rich domain. (see page 10094, columns 1 and 2). Ohnuma et al. (AZ) also teach nucleic acids and vectors encoding the mutant enzymes, as well as transformed host cells, methods of making the mutant enzymes and assays which produce geranyl diphosphate and geranylgeranyl diphosphate. (see page 10090, Table I). Thus, the mutant enzymes, nucleic acids, vectors transformed host cells, expression systems and methods for producing geranyl diphosphate and geranylgeranyl diphosphate taught by Ohnuma et al. (AZ) anticipate the instant claims, claims 1-16.

Conclusion

11. No claims are allowable.

12. The Group and Art Unit location of your application in the PTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Group Art Unit 1652.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Einar Stole, Ph.D., whose telephone number is (703) -305-4507. The examiner can normally be reached Tuesday through Friday 6:30 a.m. to 5:00 p.m.

If attempts to reach the examiner are unsuccessful, the examiner's supervisor, Robert A. Wax, can be reached on (703)-308-4216. The fax phone number for Technology Center 1600 is (703)-305-7401.

Any inquiry of a general nature or relating to the status of this application should be directed to the Technology Center 1600 receptionist whose telephone number is (703)-308-0196.

Einar Stole, Ph.D.

May 5, 1998

Rebecca Prouty

REBECCA E. PROUTY
PRIMARY EXAMINER
GROUP ~~1800~~ 1600